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Attorney Docket No. Mo-5137/MD-98-12-PF First Inventor or Application Identifier Karen L. Eagles

Title Effects of Bactericide (Peracetic Acid-Hydrogen...

TRANSMITTAL (Only for new nonprovisional applications under 37 C F.R. § 1.53(b)) Express Mail Label No. EF080092445US

PATENT APPLICATION

APPLICATION ELEMENTS See MPEP chapter 600 concerning utility patent application contents.	Assistant Commissioner for Patents ADDRESS TO: Box Patent Application Washington, DC 20231
* Fee Transmittal Form (e.g., PTO/SB/17) (Submit an original and a duplicate for fee processing) **Specification	5 Microfiche Computer Program (Appendix) 6. Nucleotide and/or Amino Acid Sequence Submission (if applicable, all necessary) a. Computer Readable Copy b. Paper Copy (identical to computer copy) c. Statement verifying identity of above copies ACCOMPANYING APPLICATION PARTS 7. X Assignment Papers (cover sheet & document(s)) 8 37 C.F.R.§3.73(b) Statement Power of (when there is an assignee) 9. English Translation Document (if applicable) 10. X Statement (IDS)/PTO-1449 Copies of IDS Statement (IDS)/PTO-1449 Citations 11. Preliminary Amendment 12. X Return Receipt Postcard (MPEP 503) (Should be specifically itemized) * Small Entity Statement filed in prior application Status still proper and desired (PTO/SB/09-12) 14. (if foreign priority is claimed) 15. Other:
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		First Named Inventor	Karen L. Eagles		
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See 37 C F R §§ 1 27		Group / Art Unit			
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1. BASIC FILING FEE	116	380	216	190	Extension for reply within second month	
Large Entity Small Entity	117	870	217	435	Extension for reply within third month	\Box
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106 310 206 155 Design filing fee 710.00	119	300	219	150	Notice of Appeal	
107 480 207 240 Plant filing fee	120	300	220	150	Filing a brief in support of an appeal	
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SUBTOTAL (1) (\$) 710.00	141	1,210	241	505	Petition to revive - unintentional	7
2. EXTRA CLAIM FEES	142	1,210	242	605	Utility issue fee (or reissue)	
Fee from Ext <u>ra Claims below</u> Fee Paid	143	430	243	215	Design issue fee	\dashv
Total Claims 24 -20 = 4 × 18 = 72 Independent 3 -3 = 0 × 80 -0	144	580	244	290	Plant issue fee	
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Mo-5137 MD-98-12-PF

EFFECTS OF BACTERICIDE (PERACETIC ACID-HYDROGEN PEROXIDE-WATER COMBINATION) TO AGRICULTURAL CHEMICALS IN BACTERIA CONTROL WHEN THEY ARE IN CONTACT WITH ONE ANOTHER

TECHNICAL FIELD OF THE INVENTION

The present invention relates to a process for inhibiting or eliminating the growth of microorganisms in pesticide suspensions. More particularly, the process of the present invention includes the addition of a combination of peracetic acid, hydrogen peroxide and water, to the pesticide suspension. Further, the process of the present invention includes the application of the peracetic acid, hydrogen peroxide, and water combination to the interior surface of the vessel in which the pesticide suspension is contained. Still further, the process of the present invention includes the application of the peracetic acid, hydrogen peroxide, and water combination to a surface in which the pesticide suspension is in contact.

BACKGROUND OF THE INVENTION

A pesticide suspension is a homogeneous mixture of small solid particles of pesticide suspended in a liquid medium. The growth of microorganisms in the pesticide suspension can cause a solid precipitate to form and therefore, a loss of homogeneity in the mixture. Formation of the precipitate and the loss of homogeneity can result in product failure due to non-uniform applications of the pesticide, and plugging of strainers and nozzles used with the application equipment.

Peracetic acid and hydrogen peroxide solutions are known in the art. French Patent No. 2,462,425, discloses a process for the preparation of stable dilute solutions of peracetic acid. U.S. Patent No. 4,051,049 discloses a formulation having from 0.5 to 20% peracetic acid, 25 to 40% hydrogen peroxide and from 0 to 5% of an anionic surfactant. U.S. Patent No. 5,656,302 discloses stable microbicidal formulations comprising a

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considerably greater quantity of peracetic acid plus acetic acid than the quantity of hydrogen peroxide.

Further, the use of peracetic acid and hydrogen peroxide solutions for purposes of sterilization and disinfection are well known. For example, commercial solutions of noncorrosive time-stable carboxylic peracids, particularly peracetic acid, are known to be useful for the sterilization and microbiological disinfection of equipment in the food industry (see U.S. Patent No. 4,587,264). In addition to the food industry, commercial peracetic acid and hydrogen peroxide solutions are also known disinfectants in the medical and dental professions. U.S. Patent No. 5,508,046 describes novel stable microbicides comprising hydrogen peroxide, peracetic acid, acetic acid, purified water, and a stabilizer having anticorrosive properties, for use in the sterilization of surgical and dental instruments.

Moreover, the commercial peracetic acid solution Minncare was developed by the Minntech Corporation and is used as a disinfectant in providing protection against short- and long-term bacterial problems for reverse osmosis membranes and their associated distribution systems.

To reduce or eliminate the growth of microorganisms in pesticide suspensions, a practice of combining or formulating the pesticide compounds with a preservative has developed in the art. U.S. Patent # 5,283,231 describes formaldehyde, sodium benzoate, glutaraldehyde, and pentachlorophenol, as effective preservatives to prevent microbial spoiling in low-melting dinitroaniline pesticide suspensions.

Not all preservatives are effective against all types of microorganisms, in all pesticide suspensions. Thus, there is a need in the art to determine specific preservatives that are effective in a particular flowable aqueous pesticide composition (i) to reduce or eliminate the growth of microorganisms, (ii) while being easy to handle during

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preparation and use, and (iii) maintaining an excellent shelf-life even during extended storage.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide a process for inhibiting or eliminating the growth of microorganisms in pesticide suspensions. This and other objects which will be apparent to those skilled in the art are accomplished by the (i) addition of a combination of peracetic acid, hydrogen peroxide, and water to the pesticide suspension, or (ii) application of the peracetic acid, hydrogen peroxide, and water combination to the interior surface of the vessel in which the pesticide suspension is contained, or (iii) application of the peracetic acid, hydrogen peroxide, and water combination to a surface which the pesticide suspension is in contact. The peracetic acid, hydrogen peroxide, and water combination is present in the water-based pesticide suspension in an amount of from about 0.05% to about 1.0% by weight of the suspension.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS OF THE INVENTION

The process of the present invention comprises (i) the addition of a combination of a peracetic acid, hydrogen peroxide, and water to a pesticide formulation; (ii) the application of a combination of peracetic acid, hydrogen peroxide, and water to the interior surface of the vessel in which the pesticide formulation is contained; and (iii) the application of a combination of peracetic acid, hydrogen peroxide, and water to a surface in which the pesticide formulation is in contact.

In the present invention, the peracetic acid, hydrogen peroxide, and water combination ("biocide combination") is used to reduce or eliminate the growth of microorganisms in the pesticide formulation. Biocides are well known in the art. Typical commercial biocides include: (i) Minncare, which is a peracetic acid solution used as a disinfectant for reverse

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osmosis membranes; (ii) Proxel GXL, which is an aqueous solution of dipropylene glycol and 17% 1,2-benzisothiazolin-2-one; and (iii) Legend MK, which includes 1.15% 5-chloro-2-methyl-4-isothiazolin-3-one and 0.35% 2-methyl-4-isothiazolin-3-one.

In the present invention, a biocide combination is added to a pesticide suspension to reduce or eliminate the growth of microorganisms in the suspension. The biocide combination constitutes from about 3.0% to about 7.0% by weight of peracetic acid, from about 19.0% to about 25.0% by weight of hydrogen peroxide, and the remainder, from about 68% to about 78% by weight, is water. The total composition by weight of the peracetic acid, hydrogen peroxide, and water, is 100%. The biocide combination is added to the pesticide suspension in an amount such that it comprises from about 0.05% to about 1.0% by weight of the pesticide suspension.

The pesticide is selected from the group consisting of an insecticide, a fungicide, and a herbicide. Suitable insecticides include the heterocyclic compounds described in U.S. Patents Nos. 5,852,012; 5,719,146; 4,849,432; and 4,742,060; which are incorporated herein by reference. Further, in a preferred embodiment of the invention, the insecticide is a chloronicotinyl or a chlorothiazole. Moreover, insecticides of the following general formulas (I), (II) and (III) are most preferred.

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$$S$$
 N
 N
 CH_3
 NO_2
 (III)

A preferred fungicide is tebuconazole, and a preferred herbicide is metribuzin.

Further, in an embodiment of the present invention, the biocide combination is applied to the interior surface of the vessel in which the pesticide formulation is contained. The method of application may be performed using any manual or automated means known in the art.

In another embodiment of the present invention, the biocide combination is applied to a surface in which the pesticide suspension is in contact. The method of application to the surface may be accomplished using any manual or automated means known in the art.

Having thus described our invention, the following examples are given as being illustrative thereof; and they are in no way meant to be limiting of the specification and the claims. All weights and percentages given are parts by weight or percentages by weight, unless otherwise indicated.

EXAMPLES

25 Example 1

A study was conducted to demonstrate the effectiveness of adding a peracetic acid, hydrogen peroxide, and water combination ("biocide combination") to inhibit or eliminate the growth of microorganisms in a water-based pesticide suspension concentrate (PROVADO 1.6F). The biocide combination was added in an amount such that it constituted from

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Mo-5137 - 6 -

about 0.0% to about 0.1% by weight of the pesticide suspension. The study was also conducted to evaluate the potential for re-growth of the bacteria after the pesticide suspension was treated with the biocide combination. The biocide combination comprised 4% by weight of peracetic acid, 20% by weight of hydrogen peroxide, and the remainder was water. Using a jiffy mixer, 0.05% of the biocide combination was added to a first sample of PROVADO 1.6F, and 0.1% of the biocide combination was added to a second sample of PROVADO 1.6F. A third sample was contained in a jug which had been sprayed with approximately 0.1% of the biocide combination prior to filling with the pesticide suspension. A fourth sample was a control sample which contained no biocide combination. All of the samples also contained 0.5% Proxel GXL.

Each of these 4 samples was divided into 8 separate samples, stored at a temperature of 30°C, and then tested for bacterial growth on a weekly basis over an 8 week period.

Initially, the control sample had approximately 11,000 cfu/ml bacteria and the other samples had no initial bacterial contamination.

None of these samples were inoculated. There was no growth of bacteria after 8 weeks in any of the samples treated with the biocide combination.

20 The results are shown in Table 1.

Table 1

		Bacteria Pr	esent/ml			
	Week	1	2	3	4	
25	Sample					
	Jug-treated; 0.1%	0/ml	0/ml	0/ml	0/ml	
	Suspension-treated; 0.05%	0/ml	0/ m l	0/ml	0/ml	
	Suspension-treated; 0.1%	0/ml	0/ m l	0/ml	0/ml	
30	Untreated	11,000/ml	8,000/ml	4,000/ml	1,000/ml	

		<u>cteria Pres</u>	ent/ml			
	Week	5	6	7	8	
	Sample					
5	Jug-treated; 0.1%	0/ml	0/ml	0/ml	0/ml	
	Suspension-treated; 0.05%	0/ml	0/ml	0/ml	0/ml	
	Suspension-treated; 0.1%	0/ml	0/ml	0/ml	0/ml	
	Untreated	0/ml	0/ml	0/ml	0/ml	

10 Example 2

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A study was conducted to demonstrate the effectiveness of adding from about 0.1% to about 1.0% by weight of a biocide combination (comprising 4% by weight of peracetic acid, 20% by weight of hydrogen peroxide, and the remainder water) to inhibit or eliminate the growth of microorganisms in a water-based pesticide suspension concentrate (ADMIRE 2F). The ADMIRE 2F samples contained bacteria that were specific to the production site. Of the six samples, three samples contained bacteria of the pseudomonas species and the other three samples contained bacteria of the flavobacterium species. To the first sample of ADMIRE 2F was added 1.0% of the biocide combination; to the second sample of ADMIRE 2F was added 0.5% of the biocide combination; and to a third sample of ADMIRE 2F was added 0.1% of the biocide combination. The bacteria present in these three samples was of the pseudomonas species. To a fourth sample of ADMIRE 2F was added 1.0% of the biocide combination; to a fifth sample of ADMIRE 2F was added 0.5% of the biocide combination; and to a sixth sample of ADMIRE 2F was added 0.1% of the biocide combination. The bacteria present in these three samples were of the flavobacterium species.

Initially, all of the ADMIRE 2F samples had approximately $1X10^6$ cfu/ml bacteria present. The samples were tested at 1, 2 and 3 hour intervals. The results are shown in Table 2.

<u>Table 2</u>
<u>Bacteria Present / ml</u>

	Time	e (hrs) 0	1	2	3	
5 Biocide <u>Conc.</u>	Bacteria <u>Species</u>					
1.0% 10 0.5% 0.1% 1.0% 0.5% 0.1%	pseudo pseudo pseudo flavo flavo flavo	1X10 ⁶ /ml 1X10 ⁶ /ml 1X10 ⁶ /ml 1X10 ⁶ /ml 1X10 ⁶ /ml 1X10 ⁶ /ml	0/ml 0/ml 0/ml 0/ml 0/ml 0/ml	0/ml 0/ml 0/ml 0/ml 0/ml 0/ml	0/ml 0/ml 0/ml 0/ml 0/ml 0/ml	

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Although the invention has been described in detail in the foregoing for the purpose of illustration, it is to be understood that such detail is solely for that purpose and that variations can be made therein by those skilled in the art without departing from the spirit and scope of the invention except it may be limited by the claims.

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WHAT IS CLAIMED IS:

- 1. A process for inhibiting the growth of microorganisms in a pesticide suspension, comprising the step of adding a biocide combination of peracetic acid, hydrogen peroxide, and water to the pesticide suspension.
- 2. The process of Claim 1 wherein the biocide combination comprises from about 0.05% to about 1.0% by weight of the pesticide suspension.
- 3. The process of Claim 1 wherein the biocide combination comprises from about 3.0% to about 7.0% by weight of peracetic acid, from about 19.0% to about 25.0% by weight of hydrogen peroxide, and from about 68% to about 78% by weight of water, wherein the total composition by weight is 100%.
 - 4. The process of Claim 1 wherein the pesticide is selected from the group consisting of an insecticide, a herbicide, and a fungicide.
 - 5. The process of Claim 4 wherein the insecticide is selected from the group consisting of chloronicotinyls and chlorothiazoles.
 - 6. The process of Claim 4 wherein the insecticide is selected from the group consisting of the following general formulas (I), (II) and (III).

$$CI$$
 N
 N
 S
 CN
 (II)

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 (III)

- 7. The process of Claim 4 wherein the herbicide is metribuzin.
- 8. The process of Claim 4 wherein the fungicide is tebuconazole.
 - 9. A process for inhibiting the growth of microorganisms in a pesticide suspension, comprising the step of applying a biocide combination of peracetic acid, hydrogen peroxide, and water to a container wherein the pesticide suspension is contained within the container.
 - 10. The process of Claim 9 wherein the biocide combination comprises from about 0.05% to about 1.0% by weight of the pesticide suspension.
 - 11. The process of Claim 9 wherein the biocide combination comprises from about 3.0% to about 7.0% by weight of peracetic acid, from about 19.0% to about 25.0% by weight of hydrogen peroxide, and from about 68% to about 78% by weight of water, wherein the total composition by weight is 100%.
 - 12. The process of Claim 9 wherein the pesticide is selected from the group consisting of an insecticide, a herbicide, and a fungicide.
 - 13. The process of Claim 12 wherein the insecticide is selected from the group consisting of chloronicotinyls and chlorothiazoles.
 - 14. The process of Claim 12 wherein the insecticide is selected from the group consisting of the following general formulas (I), (II), and (III).

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$$CI$$
 N
 NH
 NO_2
 NO_2

- 15. The process of Claim 12 wherein the herbicide is metribuzin.
- 16. The process of Claim 12 wherein the fungicide is tebuconazole.
- 17. A process for inhibiting the growth of microorganisms in a pesticide suspension, comprising the step of applying a biocide combination of peracetic acid, hydrogen peroxide, and water to a surface wherein the pesticide suspension is in contact with the surface.
- 18. The process of Claim 17 wherein the biocide combination comprises from about 0.05% to about 1.0% by weight of the pesticide suspension.
- 19. The process of Claim 17 wherein the biocide combination comprises from about 3.0% to about 7.0% by weight of peracetic acid,

from about 19.0% to about 25.0% by weight of hydrogen peroxide, and from about 68% to about 78% by weight of water, wherein the total composition by weight is 100%.

- 20. The process of Claim 17 wherein the pesticide is selected from the group consisting of an insecticide, a herbicide, and a fungicide.
- 21. The process of Claim 20 wherein the insecticide is selected from the group consisting of chloronicotinyls and chlorothiazoles.
- 22. The process of Claim 20 wherein the insecticide is selected from the group consisting of the following general formulas (I), (II) and (III).

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$$CI$$
 N
 N
 S
 CN
 (II)

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$$CI$$
 N
 N
 CH_3
 NO_2
 NO_2

- 23. The process of Claim 20 wherein the herbicide is metribuzin.
- 24. The process of Claim 20 wherein the fungicide is tebuconazole.

EFFECTS OF BACTERICIDE (PERACETIC ACID-HYDROGEN PEROXIDE-WATER COMBINATION) TO AGRICULTURAL CHEMICALS IN BACTERIA CONTROL WHEN THEY ARE IN CONTACT WITH ONE ANOTHER

ABSTRACT OF THE DISCLOSURE

The present invention relates to a process for inhibiting or eliminating the growth of microorganisms in pesticide suspensions. More particularly, the process of the present invention includes the addition of a combination of peracetic acid, hydrogen peroxide, and water to the pesticide suspension. Further, the process of the present invention includes the application of the peracetic acid, hydrogen peroxide, and water combination to the interior surface of the vessel in which the pesticide suspension is contained. Still further, the process of the present invention includes the application of the peracetic acid, hydrogen peroxide, and water combination to a surface in which the pesticide suspension is in contact.

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(Application Serial No.)

As a below named inventor. I hereby declare that:

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inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled: Effects of Bactericide (Peracetic Acid-Hydrogen Peroxide-Water Combination) to Agricultural Chemicals in Bacteria Control When They Are In Contact With One Another the specification of which (check one) is attached hereto \Box was filed on _____ as Application X Serial No. _____ and was amended on (if applicable). I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above. "D I acknowledge the duty to disclose information which is material to the patentability of this application in accordance with title 37, Code of Federal Regulations, §1.56 (a). I hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below and foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:) <u>2</u> PRIOR FOREIGN APPLICATION(S) -Priority claimed \Box \Box NONE (Day/month/year filed) Yes No (Number) (Country) \Box (Day/month/year filed) (Number) (Country) Yes No (Day/month/year filed) No (Number) (Country) Yes I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose the material information as defined in Title 37, Code of Federal Regulations, §1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application: NONE (STATUS: patented/pending/abandoned) (Application Serial No.) (Filing Date) (STATUS: patented/pending/abandoned) (Filing Date)

I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and to transact all business in the Patent and Trademark Office Connected therewith:

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FULL NAME OF SIXTH JOINT INVENTOR, IF ANY	INVENTOR'S SIGNATURE	MATE
Stephen C. Slahck	MOVENTOR'S SIGNATURE	9-22-00
RESIDENCE		CITIZENSHIP
23701 E. Blue Mills Rd., Indepen	ndence, MO 64058	U.S. Citizen
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